SPECIFICATION

Image Communication Apparatus and Image Communication Method

BACKGROUND OF THE INVENTION

Field of the Invention

5   The present invention relates to an image communication apparatus and an image communication method. Specifically, the present invention relates to an internet facsimile apparatus and an image communication method using the Internet or Local
10   Area Network.

Description of the Related Art

As a conventional facsimile apparatus, there are generally used G3 facsimile apparatuses, which perform data communication using an analog network,
15   G4 facsimile apparatus, which performs data communication using a digital network such as ISDN. The facsimile apparatuses using such the analog network and the digital network (hereinafter referred to as "public switched telephone network
20   (PSTN)" in a word) are hereinafter called G3/G4 FAX. On the other hand, The Internet facsimile apparatuses, which receive and transmit data over the Internet protocols (hereinafter referred to as IFAX), have recently been developed. Particularly,
25   standardization of an e-mail type IFAX, which receives and transmits image data using e-mail transfer protocols, is proceeding in IETF (The Internet Engineering Task Force) and ITU

(International Telecommunication Union).

IFAX comprises both an IFAX section for realizing the Internet and G3/G4 FAX sections for realizing G3 and G4 facsimile communications. As a result, if a case where a receiver side has an IFAX function, data is received and transmitted over the Internet, while in a case where the receiver side has no IFAX function, the public switched telephone network is used.

The following will explain a case in which SMTP (Simple Mail Transfer Protocol) and POP (Post Office Protocol) are used as a mail transfer protocol in data transmission by the e-mail type IFAX. IFAX transmits a mail to a SMTP server. The SMTP server transfers the mail to a POP3 server to which a receiver side belongs. The POP3 server stores the mail in a mail box in a receiving destination. The receiver side downloads the mail from the mail box in the POP3 server.

Since data communication is thus non-synchronously carried out, the capability of cannot be exchanged between IFAX and the communication terminal on the receiver side. For this reason, an automatic recognition of whether or not the communication terminal at the receiving destination possesses an IFAX function cannot be carried out. An operator of IFAX must check whether or not the receiver side possesses the IFAX function in

advance.

Moreover, G3/G4 FAX obtains information of the capability from the receiver side in the facsimile communication protocol, and transmits image data in accordance with the highest capability which both possess. However, since the capability cannot be exchanged between IFAX and the communication terminal on the receiver side, it is required that image data should be transmitted in equally accordance with the lowest capability, which the receiver side seems to possess. Otherwise, it is needed that an operator should check the capability on the receiver side and set communication conditions of IFAX manually.

SUMMARY OF THE INVENTION

An object of the present invention is firstly to provide an image communication apparatus being capable of automatically recognize whether or not a receiver side has IFAX functions and to provide its method.

Secondary, an object of the present invention is to provide an image communication apparatus being capable of automatically obtaining a capability on the receiver side so as to transmit image data in accordance with the capability and to provide its method.

The above object can be achieved by an image communication apparatus comprising:

public switched telephone communication means
for receiving and transmitting data on a public
switched telephone network;

transmitting means for transmitting an image
5   over the Internet;

identifying means for identifying receiver
side information from data received by the public
switched telephone communication means; and

communication path selecting means for
10 selecting any one of the public switched telephone
network and the Internet as a communication path
through which the image is transmitted to the
receiver side based on the identification result
obtained by the identifying means.

15 The above object can be achieved by an image
communication apparatus comprising:

public switched telephone communication means
for receiving and transmitting data on a public
switched telephone network;

20 receiving means for receiving an image over the
Internet; and

receiver side information transmitting means
for transmitting self-information to a transmitter
side using the public switch telephone communication
25 means.

The above object can be achieved by an image
communication apparatus comprising:

receiving means for receiving data including a

capability on a receiver side on a public switched telephone network;

identifying means for identifying the capability from data received; and

5   transmitting means for transmitting an image over the Internet to be suitable for the capability based on the identification result obtained by the identifying means.

The above object can be achieved by an image
10   communication apparatus comprising:

transmitting means for transmitting data including a self-capability to a transmitter side on a public switched telephone network; and

receiving means for receiving an image from the
15   transmitter side over the Internet.

The above object can be achieved by an image communication apparatus comprising:

receiving means for receiving data including a capability on a receiver side;

20   identifying means for identifying the capability on the receiver side from data received;

converting means for converting an image based on the identification result obtained by the identifying means; and

25   transmitting means for transmitting the image over the Internet.

The above object can be achieved by an image communication apparatus comprising:

transmitting means for transmitting data including a self-capability to a transmitter side; and

receiving means for receiving an image from the transmitter side over the Internet.

The above object can be achieved by an image communication apparatus comprising:

communication means for carrying out a main communication for transmitting an image over the Internet after carrying out a sub-communication for receiving data including a capability on a receiver side;

identifying means for identifying the capability on the receiver side from data received before the main communication after the sub-communication; and

main communication controlling means for controlling the communication means such that the image is transmitted to be made suitable for the capability on the receiver side base on the identification result obtained by the identifying means.

The above object can be achieved by an image communication apparatus comprising:

receiving means for receiving data including a mail address;

identifying means for identifying the mail address on a receiver side from the received data; and

transmitting means for transmitting an image to the identified mail address over the Internet.

The above object can be achieved by an image communication method comprising the steps of:

5   receiving data from a receiver side on a public switched telephone network;

identifying receiver side information from the data;

selecting any one of the public switched telephone network and the Internet as a

10   communication path through which an image is transmitted to the receiver side based on the identification result obtained by the identifying means.

The above object can be achieved by an image

15   communication method comprising the steps of:

receiving data including a capability on a receiver side on a public switched telephone network;

identifying the capability on the receiver from

20   data received; and

transmitting an image over the Internet to be suitable for the capability on the receiver side based on the identification result obtained by the identifying step.

25   The above object can be achieved by an image communication method comprising the steps of:

receiving data including a capability on a receiver side;

identifying the capability on the receiver side from data received;

converting an image based on an identification result obtained by the identifying step; and

5   transmitting the converted image over the Internet.

The above object can be achieved by an image communication method comprising the steps of:

performing sub-communication for receiving data
10   including a capability on a receiver side;

identifying the capability on the receiver side from data received in the sub-communication step; and

performing main-communication for transmitting an image over the Internet to be suitable for the capability
15   based on the identification result obtained the identifying step.

The above object can be achieved by an image communication method comprising the steps of:

performing sub-communication for receiving data
20   including a capability on a receiver side;

identifying the capability on the receiver side from data received in the sub-communication step;

storing an identification result obtained by the identifying step to storing means; and

25   performing main-communication for transmitting an image over the Internet after the sub-communication.

The above object can be achieved by an image communication method comprising the steps of:

receiving data including a mail address on a receiver side;

identifying the mail address from the data; and

transmitting an image to the mail address identified

5   in the identifying step over the Internet.

The above object can be achieved by a storage medium having a program registered thereon, the program causing a computer, having public switched telephone communication means for receiving and transmitting data on

10   a   public   switched   telephone   network   and   Internet transmitting means for transmitting data over the Internet, to execute procedures for;

receiving data on the public switched telephone communication network by the public switched telephone

15   communication means;

identifying receiver side information from the data, processing for selecting any one of the public switched telephone   network   and   the   Internet   as   a communication   path   through   which   an   image   is

20   transmitted   to   the   receiver   side   based   on   an identification result; and

transmitting the image through the selected communication path by the public switched telephone communication   means   or   the   Internet   transmitting

25   means.

The above object can be achieved by a storage medium having a program registered thereon, the program causing   a   computer,   having   public   switched   telephone

communication means for receiving and transmitting data on a public switched telephone network and Internet transmitting means for transmitting data over the Internet, to execute procedures for;

5   receiving data including a capability on a receiver side by the public switched telephone communication means;

identifying the capability on the receiver side from received data; and

transmitting an image over the Internet to be suitable

10   for the capability on the receiver side based on the identification result by the Internet transmitting means.

The above object can be achieved by a storage medium having a program registered thereon, the program causing a computer, having receiving means for receiving

15   data including a capability on a receiver side and transmitting means for transmitting data to the receiver side over the Internet, to execute procedures for;

receiving data including the capability by the receiving means;

20   identifying the capability from the data;

converting an image based on the identification result; and

transmitting the image to the receiver side over the Internet by the transmitting means.

25   The above object can be achieved by a storage medium having a program registered thereon, the program causing a computer, having communication means for making communications with a receiver side, to execute

procedures for;

performing main communication for transmitting an image over the Internet after performing a sub-communication for receiving data including a capability on the receiver

5 side;

identifying the capability on the receiver side from data received before the main communication after the sub-communication; and

transmitting the image to the communication means to

10 be suitable for the capability on the receiver side based on the identification result in the main communication.

The above object can be achieved by a storage medium having a program registered thereon, the program causing a computer, having communication means for making

15 communications with a receiver side and storing means, to execute procedures for;

performing main communication for transmitting an image over the Internet after performing a sub-communication for receiving data including a capability on the receiver

20 side;

identifying the capability on the receiver side from data received before the main communication after the sub-communication; and

storing the identification result in the storing

25 means.

The above object can be achieved by a storage medium having a program registered thereon, the program causing a computer, having receiving means for receiving

data including a mail address on a receiver side and transmitting means for transmitting an image over the Internet, to execute procedures for;

receiving the data by the receiving means;

5   identifying the mail address from the data; and

transmitting the image to the identified mail address over the Internet by the transmitting means.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects and features of the
10 invention will appear more fully hereinafter from a consideration of the following description taken in connection with the accompanying drawing wherein one example is illustrated by way of example in which;

FIG. 1 is a conceptual view of a network
15 according to an embodiment of the present invention;

FIG. 2 is a block diagram showing the hardware configuration of IFAX according to the embodiment of the present invention;

FIG. 3 is a block diagram showing the functions
20 of IFAX according to the embodiment of the present invention;

FIG. 4 is a block diagram showing the functions of an IFAX processing section in IFAX according to the embodiment of the present invention;

25   FIG. 5 is a view showing a format of a TIFF file;

FIG. 6 is a view showing one example of a receiver side information table in IFAX according to the embodiment of the present invention;

FIG. 7 is a flowchart showing each step of IFAX transmission operations in a transmitter side according to the embodiment of the present invention;

FIG. 8 is a sequence view showing a communication protocol between the transmitter side and the receiver side according to the embodiment of the present invention; and

FIG. 9 is a frame structural view of an NSF signal transmitted from the receiver side according to the embodiment of the present invention.

DETAILED DESCRIPTION OF THE

PREFERRED EMBODIMENTS

An embodiment of the present invention will be more specifically explained with reference to the accompanying drawings.

Referring to FIG. 1, the network, which IFAX according to the embodiment operates, will be explained. FIG. 1 is a conceptual view of the network according to the embodiment. An e-mail transmitted from IFAX 1 is received a mail server 4 provided over the Internet 3 via a local area network (LAN) 2. The mail server 4 saves the e-mail in a mail box 5 provided in a secondary storing apparatus 5.

An IFAX 6 or a personal computer (PC) 7, serving as a receiver side terminal, makes an inquiry to the mail server 4. Then, if an incoming mail is

presented in a self-mail box 5a, a receiving operation is carried out and the e-mail is received from the mail server 5.

The mail server 4 comprises, for example, a POP
5 (Post Office Protocol) server.

The Internet facsimiles (IFAXes) 1 and 6 are connected to the Internet 3 through LAN 2 or by a dialup connection.

IFAXes 1 and 6 have a G3/G4FAX function. IFAXes
10 1 and 6 carry out facsimile communications between IFAXes and G3/G4FAXES 9 via a public switched telephone network (PSTN) 8.

FIG. 2 is a block diagram showing a software configuration of IFAX according to the aforementioned
15 embodiment. A CPU 11 executes programs and controls the entirety of the apparatus. A ROM 12 stores the programs executed by CPU 11.

A RAM 13 is comprises a work area in which programs are executed and a storing area in which
20 various data such as e-mail, image file, etc are temporarily stored.

A scanner 14 scans an original to obtain image data. The image data is stored in the storing area of RAM 13. A printer 15 prints out received image
25 data.

A compressing and decompressing section 16 compresses raw image data scanned by the scanner into a compressed image film such as an MH file and

decompresses the received image file. A telephone
circuit control section 17 is an interface for
receiving and transmitting data through facsimile
communications and receiving and transmitting data
on PSTN 8. The telephone circuit control section 17
comprises a CCU (communication control unit), a
modem, an NCU (network control unit), etc.

A network control section 19 is an interface for
executing protocols necessary for receiving and
transmitting the e-mail on LAN 2 and the Internet
3.

A panel operation section 20 comprises dial keys
and a touch panel. The panel operation section 20
receives operations done by the operator such as
designation on the receiver side, transmission start
instruction, etc. CPU 11 controls the respective
sections based on an electric signal input from the
panel operation section 20.

FIG. 3 is a functional block for explaining IFAX
functions according to the aforementioned
embodiment.

An operation kind determining section 31
determines a kind of operations by an electric signal
input from the operation panel 20. The operation
kind determining section 31 provides an instruction
to each section based on the determination result.

A receiver side information identifying
section 32 identifies receiver side information

received from the receiver side via the telephone circuit control section 17 and the network control section 18.

A receiver side information table 33 is provided in RAM 13. The table 33 is a storing area where the discrimination result obtained by the receiver side information identifying section 32 is made to correspond to the receiver side so as to be stored.

A determining section 34 determines which communication paths should be used and whether or not an image conversion are needed based on receiver side information on the receiver side stored by the receiver side information table 33.

An IFAX processing section 35 and a facsimile control section 36 transmit image data stored in RAM 13 by the respective communication systems in accordance with the instruction sent from the operation kind determining section 31 or the determining section 34. Also, the IFAX processing section 35 and the facsimile control section 36 receive image data on the other hand.

An image conversion processing section 37 carries out conversion of image data when the determination section 34 determines that image conversion is needed. This conversion of image data includes scaling, reduction in color, linear density conversion, a change in an image compression type, etc.

FIG. 4 is a block diagram showing the functions of the IFAX processing section 35. At a transmitting time, first of all, the raw image read by the scanner 14 is compressed to obtain compressed data by the
5 compressing decompressing section 16. If need be, the raw image or the compressed data will be converted by the image conversion processing section 37. Next, compressed data is converted to a TIFF file by a TIFF converting section 41. Then, an e-mail generating
10 section 42 generates an e-mail including TIFF file as an appended file. In other words, TIFF file is text coded, and stored in a data section of a complex structured mail such as MIME (Multipurpose Internet Mail Extensions) (IETF; RFC 2045, RFC 2046, RFC 2048,
15 RFC 2049). Thereafter, a mail transmitting section 43 sends the e-mail to the mail server 4 via the network control section 19.

Also, an encryption processing section 47 encrypts e-mail data in accordance with the
20 instruction sent from the operation panel 20 or the determining section 34. In the encryption, an encryption technique, which is employed in general e-mails such as S/MIME or PGP/MIME, etc., can be used.

On the other hand, at a receiving time, a mail
25 receiving section 44 receives the e-mail from the mail server 4. When e-mail data is encrypted, a decoding section 48 decodes e-mail data. A binary converting section 45 binary converts an appended

file portion of the received e-mail to a TIFF (Tagged Image File Format) file from the text file. Thereafter, a TIFF expanding section 46 expands the TIFF file. Next, the compressing and decompressing

5 section 16 decompresses compressed data and sends decompressed data to the printer 15. The printer 15 prints out an image.

One original having a plurality of pages is stored in one TIFF file. Each page of the original

10 is converted to one image compressed file. The TIFF file used in IFAX is described in the document RFC2301 "Format for Internet FAX" (McIntyre, et al; March 1998). FIG. 5 shows the format of TIFF file. In the TIFF file, a header 51 appears at its top,

15 and pairs of IFD (Image File Directory) 53 and image data 53 for one page, which correspond to the number of pages, appear after the header 51. The header 51 contains plurality of information. One of the information signifies what type of CPU registered

20 this data. The other one signifies value of offset from the head of this data to the firs IFD. The method for showing a word differs, depending on the type of CPU. In IFD 52, a width of paper, the number of vertical lines, a compressing method, bit (MSB

25 or LSB) positioned at the left of data, offset of data, the number of bytes of data are contained.

IFAX is intended to surely carry out communications with the minimum capability. As

described in the document RFC2305 "A Simple Mode of Facsimile Using Internet mail" (K. Toyoda et. Al; March 1998), the minimum capability, which IFAX should possess, is specified as "simple mode."

5   More specifically, the communication protocol is SMTP, and transmitter side and receiver side support MIME and the minimum set of TIFF file.

The minimum set is defined in the above RFC 2301. In this document, five sets, S, F, J, L, M of TIFF 10   file can be considered, depending on a facsimile mode and a profile which are supported by the IFAX. The lowest one is the minimum set.

More specifically, the minimum set specifies the following points:

15   A monochrome image is supported, the compression type is MH (Modified Huffman coding), CPU of Intel type is used, the width of paper is 1728 (corresponding to A4 size), resolution is 200dpi, and data list is LSB.

20   The upper set than the minimum set supports a gray scale image, a color image, and the other compression types such as MR, MMR, JBIG, JPEG.

Moreover, although RFC2305 describes that encryption such as S/MIME and PGP/MIME can be used 25   in the simple mode, this is not the indispensable function.

Next, the receiver side information identifying section 32 will be specifically explained. The receiver side

information identifying section 32 communicates with the receiver side to exchange receiver side information. In this embodiment, facsimile communication on PSTN 8 is used to exchange receiver

5   side information. IFAX on the receiver side transmits receiver side information to a facsimile information frame (FIF) included in a general facsimile protocol. The receiver side information identifying section 32 identifies receiver side

10   information from facsimile information frame and stores the result in the receiver side information table 33.

Receiver side information includes information (hereinafter simply referred to as "IFAX function")

15   having an IFAX function, an apparatus capability, and mail addresses. The apparatus capability includes the linear density, print paper size, and coding system of image compression, which are necessary for facsimile communication. In the

20   coding system, HM, MR, and MMR, which are used in G3/G4FAX, and JPEG, JBIG, which are used in IFAX, are included.

The receiver side information table 33 will be specifically explained. As shown in FIG. 6, in the

25   receiver side information table 33, the FAX numbers and the mail addresses are registered to specify the receiver side. Also, the apparatus capabilities are registered in accordance with these receiver side

specifying information. Moreover, in the receiver side information table 33, a flag showing the IFAX function may set a flag.

Next, the determining section 34 will be specifically explained. At first, when there is no entry in an item of an e-mail address corresponding to the FAX number on the receiver side sent from the operation kind determining section 31, the determining section 34 determines that the receiver side has no IFAX function. In this case, the determining section 34 provides an instruction to a facsimile control section 36 to transmit image data over PSTN 8. While, when there is an e-mail address corresponding to the FAX number with reference to the receiver side information table 33, the determining section 34 determines that the receiver side has IFAX function. In this case, the determining section 34 provides an instruction to an IFAX processing section 35 to transmit image data over the Internet 3.

Secondly, the determining section 34 controls the IFAX processing section 35, the facsimile control section 36 and the image conversion processing section 37 with reference to the receiver side information table 33 in order to adapt image data to the apparatus capability on the receiver side. More specifically, in a case where the transmitter side supports high resolution but the receiver side

supports only lower resolution, the determining section 34 causes the image conversion processing section 37 to carry out the linear density conversion for an image. Also, in a case where the transmitter

5 side supports the print paper whose size is larger than that of the receiver side, the determining section 34 causes the image conversion processing section 37 to reduce the image. Thereafter, the IFAX processing section 26 converts image data, which has

10 been subjected to the image conversion, to an e-mail so as to be transmitted over the Internet 3. In other words, when the transmitter side supports the upper set than the minimum set but the receiver side supports only the minimum set, the transmitter

15 side reduces the image to the minimum set which is lower level than the set which the transmitter itself can support, and sends the reduced image.

Next, the IFAX communication protocol according to the aforementioned embodiment will be

20 explained. FIG. 7 is a flowchart showing the respective steps of the transmitting actions of IFAX on the transmitter side according to the aforementioned embodiment. FIG. 8 is a sequence view showing the communication protocol between the

25 transmitter side and the receiver side.

Here, it is assumed that IFAX 1 is the transmitter side and that IFAX 6 on the receiver side has both the IFAX function and G3/G4FAX function

similar to IFAX 1. Also, it is assumed that the transmitter side 1 has not yet recognized information of the receiver side 6. Moreover, it is assumed that the telephone circuit control section

5   17 carries out data receiving and transmitting using the communication protocol of G3 facsimile.

An operator inputs a FAX number on the receiver side from the panel operation section 20 and instructs transmission. When the instruction of

10 transmission is detected in step(hereinafter referred to as ST) 701, the scanner 14 scans the original in ST702 and converts it to an electrical signal so as to obtain image data. The obtained image data is stored in RAM 13.

15   Next, in ST703, the determining section 34 checks whether or not there is an e-mail address corresponding to the FAX number input to the receiver side information table 33. In this example, since the transmitter side has not yet obtained

20 information of the receiver side 6, the receiver 6 is unregistered in the receiver side information table 33 and there is naturally no mail address corresponding to the FAX number. Therefore, the determining section 34 outputs an instruction

25 command for executing communications to the facsimile control section 5 in accordance with the communication protocol of G3 facsimile.

In ST704, the facsimile control section 36

controls the telephone circuit control section 17 in accordance with the instruction command and calls to the receiver side (F801 in FIG. 8).

Thereafter, in the receiver side 6, when the
5   incoming call is detected, CDE (Called Station Identification) is transmitted to the transmitter side 1 from the receiver side 6 in case of an automatic incoming call (F802 in FIG. 8). Note that CED is an optional signal and is not always transmitted.

10   In ST705, the transmitter side 1 communicates with the receiver side 6 to exchange information. First of all, control signals each containing NSF (Non-Standard Facilities) and DIS (Digital Identification Signal) showing standard facilities
15   (hereinafter referred to as "NSF signal" and "DIS signal", respectively) are transmitted from the receiver side to the transmitter side 1 (F803, F804 in FIG. 8).

FIG. 9 is a frame structural view of the NSF
20   signal transmitted from the receiver side according to the above-mentioned embodiment. As shown in FIG. 9, the NFS signal comprises a flag sequence (F), an address field (A), a control field (C), a facsimile control field (FCF) using NSF, a facsimile
25   information field (FIF), a frame check sequence (FCS), and a flag sequence (F).

In FIF, IFAX function, mail address, and apparatus capability are contained in addition to

the existing facsimile functions as provided in ITU standard. The apparatus capability includes the linear density, print paper size, and the image coding system, which are necessary for facsimile communication.

Next, the receiver side information identifying section 32 identifies receiver side information from FIF of the NSF signal.

Thereafter, conversely, transmission side information is transmitted from the transmitter side 1 to the receiver side 1 (F805 in FIG. 8). For this reason, a control signal (hereinafter referred to as "NSS signal") containing NSS (Non-Standard Setup), which is a transmission command to NSF signal, is transmitted (F805 in FIG. 8). The frame structure of NSS signal is the same as that of NSF signal, and has the self- IFAX function, the self- mail address, and the self-apparatus capability in FIF.

When the NSS signal is normally received by the receiver side 6, a reception preparation confirmation signal CFR (Confirmation to Receive) is sent back to the transmitter side 1 (F806 in FIG. 8).

Note that message data can be retransmitted through the Internet facsimile communications when an error occurs in course of communication in F804 and the following shown in FIG. 8.

In ST706, the receiver side information

identifying section 32 records identified receiver side information to the receiver side information table 33.

In ST707, the determining section 34 determines whether or not the receiver side 6 has the IFAX function. More specifically, the determining section 34 checks whether or not the mail address of the transmitter side 6 is registered with reference to the receiver side information table 33. Then, when there is the mail address, the determining section 34 determines that the receiver side 6 has the IFAX function, and when there is no mail address, the determining section 34 determines that the receiver side 6 has no IFAX function.

In this example, since the receiver side 6 has the IFAX function, the determining section 34 provides an instruction to the facsimile control section 36 to disconnect the network in ST708.

In ST709, the determining section 34 determines whether or not the image conversion is needed with reference to the receiver side information table 33. When the image conversion is needed, the image conversion processing section 37 carries out the conversion in accordance with the determination result by the determining section 34 in ST710. When the determining section 34 determines that no image conversion is needed in ST709, ST710 is skipped.

Next, in ST711, the IFAX processing section 35

converts image data to an electric mail as already explained. In ST712, the IFAX processing section 35 transmits the e-mail to the mail server 4 over the Internet 3.

5   On the other hand, when the receiver side is G3/G4 FAX 9 unregistered, the determining section 34 determines that the receiver side has no IFAX function in ST707. In this case, the determining section 34 transmits image data without disconnecting the 10   network in accordance with G3 facsimile protocol. In other word, in ST713, it is determined whether or not the image conversion is needed. When the image conversion is needed, the image converting section 37 converts image data in accordance with 15   the determination result in ST714. When it is determined that no image conversion is needed in ST713, ST714 is skipped.

Next, in ST715, the facsimile control section 36 transmits image data to G3/G4FAX 9 in accordance with 20   G3 facsimile protocol.

The above explained the case in which the transmitter side was not registered in the transmitter side information table 33. Next, the case in which the transmitter side is registered in 25   the transmitter side information table 33 will be explained. When the transmitter side has the IFAX function, there is the mail address, corresponding to the FAX number on the transmitter side, in the

transmitter side information table 33 in ST703. For this reason, the operation goes to ST709, and image data is transmitted over the Internet 3.

On the other hand, when the transmitter side has no IFAX function, the operation goes to ST704 and the following and image data is transmitted to the transmitter side on PSTN8 in accordance with the G3 facsimile protocol.

As explained above, according to IFAX1 of the aforementioned embodiment, the facsimile control section 36 receives the signal including receiver side information from the receiver side. Then, the receiver side information identifying section 32 identifies the presence or absence of the IFAX function on the receiver side from the received signal. Sequentially, when the receiver has the IFAX function, the determining section 34 determines that image data is transmitted over the Internet 3. While, when the receiver has no IFAX function, the determining section 34 determines that image data is transmitted on PSTN 8. Therefore, the IFAX 1 can automatically select the suitable communication path without the operator checking the presence or absence of the IFAX function on the receiver side in advance. Moreover, the operator does not have to designate the communication path using the operation panel 20. As a result, necessary time of PSTN 8 whose communication charge is high can be restrained to

only the pre-protocol for exchanging the presence or absence of the IFAX function, so that the communication charge can be reduced.

Also, the receiver side information identifying section 32 registers the result of identification in the receiver side information table 33. For this reason, at the next time and the following, there is no need of performing communications on PSTN 8 for identifying the presence or absence of the IFAX function, so that the communication charge can be further reduced.

Further, according to IFAX 1 of the aforementioned embodiment, the facsimile control section 36 receives a signal including receiver side information from the receiver side on PSTN 8. Then, the receiver side information identifying section 32 identifies the apparatus capability of the receiver side from the received signal. The determining section 34 provides an instruction to the IFAX processing section 35 to transmit the e-mail including image data suitable for the apparatus capability of the receiver side. Since this makes it possible to exchange the apparatus capability between the transmitter side and the receiver side, image data can be transmitted in accordance with the highest level which the receiver side supports as in the conventional case. Also, since the operator does not have to check the apparatus capability of the receiver side, the transmission operation becomes simple.

In conventional IFAX, in a case where the transmitter

side does not recognize the apparatus capability on the
receiver side, the transmission must be performed in
accordance with the simple mode defined by the
aforementioned RFC 2305 such that the receiver side normally

5   receives image data. When the explanation is given in view
of the TIFF file format, the transmitter side must carry
out transmission equally with the minimum set, which
is the lowest in TIFF file sets.

In contrast with the above, IFAX according to

10   the aforementioned embodiment can transmit the TIFF
file which is upper set than the minimum set, which
the receiver side supports. Moreover, the operator
does not have to carry out a special operation, and
the   transmission   can   be   carried   out   without

15   considering the apparatus capability on the receiver
side. As a result, the receiver can receive image
data of higher quality without generating errors.

Namely, in a case where the transmitter side and
the receiver side support the upper capability than

20   the   simple   mode   in   common   with   each   other,   the
transmitter side transmits image data directly. In
a case where the receiver side supports only the
simple mode, the transmitter side transmits image
data   in   a   simple   mode.   More   specifically,   for

25   example, the image is converted to comply with the
simple mode. This eliminates the inconvenience in
which image data must be transmitted in the simple
mode even if the transmitter side has the upper

self-capability than the simple mode.

Also, according to the IFAX as in the aforementioned embodiment, the receiver side information identifying section 32 registers the

5   identification results in the receiver side information table 33. The determining section 34 provides an instruction to the IFAX processing section 35 to transmit the e-mail, which is suitable for the apparatus capability of the receiver side, to the receiver side with

10 reference to the receiver side information table 33. This eliminates the necessity of exchanging the apparatus capability at the next transmission and the following, thereby making it possible to reduce the required time for communication.

15 In the aforementioned embodiment, the determining section 34 provides image conversion processing to image data to be suitable for the apparatus capability of the receiver side. Other than the above, it is possible to encrypt e-mail when

20 the receiver side provides for encryption. Thus, the scope of the present invention includes every process adapting the communication of the image over the internet to the apparatus capability of the receiver side.

25 Also, according to the above-mentioned embodiment, when IFAX 1 has no apparatus capability of the receiver side, an operation for obtaining the apparatus capability is carried out. However, the

present invention is not limited to this case, and the apparatus capability may be obtained from the receiver side every time, periodically, or at a designated time in order to deal with the update of

5   the apparatus capability.

Moreover, according to IFAX1 as in the aforementioned embodiment, the facsimile control section 36 receives the signal including received side information from the receiver side on PSTN 8.

10   Then, the receiver side information identifying section 32 identifies the mail address of the receiver side from the received signal. Thereafter, the receiver side information identifying section 32 registers the mail address to the receiver side

15   information table 33. As a result, the operator on the transmitter side does not have to check the mail address on the transmitter side, the operator has only to know the FAX number. Also, since the mail address is registered in the receiver side

20   information table 33, it is unnecessary to check the mail address at the next time and the following. Moreover, if the mail address on the receiver side is displayed on the display section (not shown) in the next communication and the following, the

25   operator makes it easy to eliminate the necessity of checking the mail address on the receiver side.

In a case where the mail address is updated, the operator inputs the FAX number from the operation panel 20

and instructs the update of mail address even if the corresponding mail address is registered into the receiver side information table 33. This causes the actions in ST704 to ST706 shown in FIG. 8 to be executed so that the mail

5 address may be obtained.

Also, after the end of communications, IFAX 1 can display the IFAX capabilities of the receiver side, mail address, and apparatus capability on the display section (not shown), and can carry out a journal output to the printer

10 15. Thereby, the operator can easily recognize whether or not the receiver side possesses the IFAX capabilities or what capability the receiver side possesses.

The present invention is not limited to the above-mentioned embodiment. For example, according to the

15 aforementioned embodiment, receiver side information and transmitter side information are included in the NSF signal and NSS signal, respectively, in accordance with the present protocol. However, if the protocol is changed in the future, it is possible to include receiver side information and

20 transmitter side information in the other signal so as to be transmitted.

The above-mentioned embodiment explained the case in which G3 facsimile communication was taken as an example. However, the same effect as that of the present invention

25 can be obtained in the facsimile communication by the other protocol such as G4 facsimile communication, etc.

The above-mentioned embodiment explained the case in which the apparatus possession capabilities were obtained

in the communications in accordance with the facsimile protocol. However, one aspect of the present invention is that the pre-communication for obtaining the apparatus capability from the receiver side is executed prior to the actual communication in which the transmission of image data is carried out over the Internet, whereby the actual communication suitable for the apparatus capability of the receiver side can be performed. Therefore, the use of the facsimile communication to the pre-communication is no more than one specific form of the present invention. The available communication systems are all included in the range of the present invention.

For example, the communication protocol other than the facsimile communication protocol using the public switched telephone network can be used in the pre-communication. Moreover, LAN or the Internet can be used in the pre-communication. In the Internet protocol, for example, an e-mail transfer protocol such as SMTP, POP, IMAP (Internet Message Access Protocol) and a file transfer protocol such as HTTP (Hypertext transfer protocol), FTP (File Transfer Protocol) are used, whereby receiver side information is obtained and transmitter side information can be transmitted.

In the aforementioned embodiment, receiver side information can be obtained by executing direct communication with the receiver side. However, receiver side information is stored in the other

communication apparatus such as a WWW server, a mail server, and communication with such a communication apparatus is carried out, whereby receiver side information may be obtained.

5   It is needless to say that the other aspects can be included in the present invention.

Moreover, the above embodiment explained the example of the facsimile apparatus. However, the other image communication apparatuses can be 10   included in the range of the present invention. For example, the present invention includes PC, which is connected to the LAN card or the modem, to be over the Internet. The scanner or the printer can be connected to the PC through an outer I/F. Also, the 15   present invention includes a network scanner having a network communication interface, and a network copy machine. Further, the present invention includes an image complex apparatus having capabilities such as a scanner, a printer, a copy 20   machine, a facsimile apparatus, etc.

Moreover, the present invention includes a FAX server. The FAX server transfers data transmitted from a client's PC or IFAX to G3/G4FAX and transfers facsimile data to the client's PC from G3/G4FAX.

25   Further, the present invention includes a gateway apparatus for carryout out a relay between G3/G4FAX and IFAX.

Furthermore, the present invention includes a

computer-readable storing medium storing a program for executing the same processing as that of IFAX according to the present invention.

The present invention is not limited to the
5   above described embodiments, and various variations and modifications may be possible without departing from the scope of the present invention.
This application is based on the Japanese Patent Applications No.HEI 10-92929 filed on April 6, 1998,
10 and No.HEI 11-81406 filed on March 25, 1999,entire content of which is expressly incorporated by reference herein.